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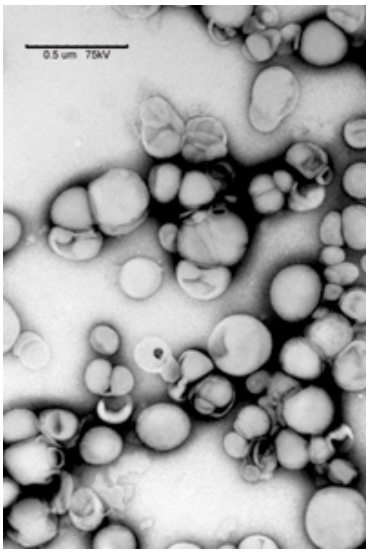
Dual system attack against cancer

A dual system of nanoparticles injected into the bloodstream can locate and kill cancer tumours in mice according researchers in America.



Chemists at the University of California (UC) in San Diego worked with bioengineers at MIT and UC Santa Barbara cell biologists to develop a dual system of nano materials – one to find and adhere to cancer tumours and one to kill them.

"This study represents the first example of the benefits of employing a cooperative nanosystem to fight cancer," said Michael Sailor, professor of chemistry and biochemistry at UC San Diego.

Sailor likened the nanoparticles to soldiers attacking an enemy base. The first nanoparticle – gold nanorod activators able to accumulate in tumours and act like an antenna – is the Special Forces team who mark the target. The second responder nanoparticles – coated with special targeting molecules for that specific tumour – are the Air Force who deliver a laser-guided bomb to destroy the target.

Researchers designed one type of responder particle with strings of iron oxide – so called nanoworms – which shows up brightly with MRI. Sailor suggests could be used to identify the size and shape of a tumour before surgery. They also developed a second hollow, doxorubicin-loaded nanoparticle which was shown to arrest and shrink a tumour growing in a mouse and could therefore kill the tumour without the need for surgery.

Nanoparticles employed to attach to diseased cells or deliver drugs to these cells while ignoring healthy cells often conflict with each other. Sangeeta Bhatia, physician, bioengineer and professor of Health Sciences and Technology at MIT said nanoparticles engineered to circulate through a patient's body for long periods are more likely to encounter a tumour, but may not be able to stick to it, and similarly a particle engineered to adhere tightly to tumours may not stay in the body long enough to encounter one in the first place.

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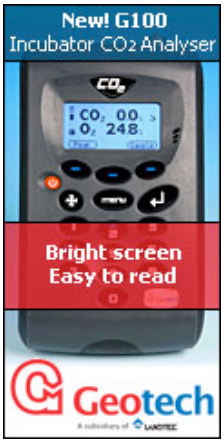

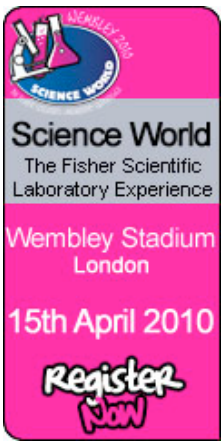

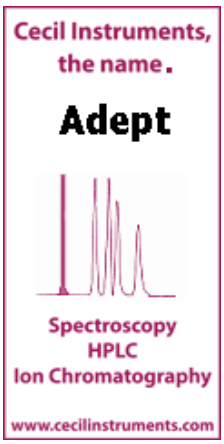

Doctors often recommend a cocktail of drug molecules to tackle the disease on as many fronts as possible as these combinations have greater effect than a single drug alone, so a multi-drug approach is not uncommon. But treating tumours with nanoparticles is challenging because immune cells can pull them from circulation, preventing them from reaching their target.

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